



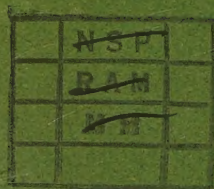
ZANZIBAR PROTECTORATE

Annual Report
of the
Department of Agriculture
1957

ZANZIBAR

PRINTED BY THE GOVERNMENT PRINTER, 1958

Price: Shs. 2/-



STAFF OF THE DEPARTMENT OF AGRICULTURE

<i>Director</i>	A. K. BRIANT, O.B.E., M.A. (Cantab), A.I.C.T.A.
<i>Senior Agricultural Officer</i> ...	G. E. TIDBURY, B.Sc. (Lond.), A.R.C.S., A.I.C.T.A.
<i>Agricultural Officers</i>	R. K. TREMLETT, B.Sc. (Lond.), A.R.C.S., A.I.C.T.A. J. V. WEBDALE, M.A. (Oxon). B. BUCKLER, B.Sc. (Reading,) D.T.A.. SAID HAMED MAULY, B.Sc. (Reading).
<i>Assistant Agricultural Officers</i> ...	OTHMAN SHARIFF, Mak. Dip. (Vety. Science), S.D.A., S.D.D.H. (Glas.). M. A. GHASSANY, Mak. Dip. (Agric.), c.d.a., (Seale Hayne). K. A. BOWDEN, N.D.A., M.R.A.C. G. I. WALKER, S.D.A. S. A. MORTISHED, c.d.a. (Manitoba). J. B. DE SOUZA, B.Sc. (Agric.) (Poona). Y. O. K. HASSANIA, B.Sc. (Agric.) (Poona).
<i>Entomologist</i>	F. L. VANDERPLANK, M.Sc. Ph.D., M. INST. BIOL., F.R.E.S.
<i>Field Assistant to Entomologist</i> ...	L. J. STEVENS.
<i>Veterinary Officer</i>	AHMED RASHID, M.R.C.V.S., D.V.T.M.
<i>Government Chemist</i>	J. JAGO, B.Sc. (W. Aust.), A.R.A.C.I.
<i>Forest Officer</i>	T. A. COUPPIS, B.A. (Oxon).
<i>Foresters</i>	A. A. WADUD, Mak. Dip. (Agric.), Dip. in Forestry. P. DOWNING, Forestry Com. Cert.
<i>Fisheries Officer</i>	K. F. KING.
<i>Field Supervisor, Fruit Scheme</i> ...	I. G. C. SQUIRE.
<i>Inspector of Produce</i>	A. C. E. CALLAN, M.B.E.
<i>Manager, Experimental Control of Clove Diseases</i>	T. E. C. ROBINS.
<i>Manager of Plantations</i>	ALI KHAMIS, Mak. Dip. (Agric.).
<i>Supervisor, Rice Scheme</i>	J. R. CLARKE.
<i>Mechanical Superintendent, Rice Scheme</i>	J. PROUDLOVE.
<i>Office Superintendent</i>	L. PAUL.

CONTENTS

Section A. Agriculture in the Protectorate

	<i>Page</i>
1. GENERAL	1
2. WEATHER	1
3. PRINCIPAL CROPS: Cloves	2
Coconuts and Copra	4
4. SUBSIDIARY EXPORT CROPS	6
5. FOOD CROP PRODUCTION	6
6. ANIMAL HUSBANDRY	7

Section B. The Work of the Department of Agriculture

1. STAFF	9
2. THE DEVELOPMENT PROGRAMME	9
3. CROP HUSBANDRY	10
Cassava	10
Cocoa	10
Chillies	11
Citrus	11
Cloves	12
Coconuts	13
Coffee	14
Derris	14
Kapok	15
Nutmeg	15
Pepper	15
Pineapples	15
Rice	15
Tobacco	16
Ylang-ylang	16
4. MECHANICAL CULTIVATION	16

	<i>Page</i>
5. STOCK HUSBANDRY	18
Stock Improvement	18
Pasture Improvement	19
Stock Raising (Cattle Ranches)	19
Veterinary Activities (Disease Control)	21
6. FORESTRY	22
7. FISHERIES	23
8. EDUCATION	24
9. DISTRIBUTION OF PLANTING MATERIAL	25
10. GOVERNMENT PLANTATIONS	25
11. CHEMICAL LABORATORY	27
12. PRODUCE INSPECTION	28
13. STORED PRODUCTS	29
14. PRINCIPAL AGRICULTURAL LEGISLATION	31

Appendices:

I. Statement of Revenue and Expenditure of the Government Plantations	32
II. Distribution of Planting Material	33
III. Domestic Exports, 1957	34
IV. Clove Production for Thirty-five Crop Years	35
V. Rainfall Totals for 1957	36

ZANZIBAR PROTECTORATE

Annual Report of the Department of Agriculture, 1957

SECTION A.—AGRICULTURE IN THE PROTECTORATE

1. General

Events in 1957 were dominated by the harvesting of a clove crop which exceeded any crop hitherto produced. This bumper crop came at a time when cash in the hands of the agricultural community was becoming restricted, and brought with it serious problems of harvesting and of finance. The former were largely solved by expeditious action on the part of Government. The latter, which arose partly from the imposition of financial restrictions connected with the raising of the bank rate, and partly from the desire of clove growers for immediate and worth-while monetary returns, were much more difficult to overcome and resulted in drastic measures being taken.

The year will be remembered also for the acceptance by the legislature of the removal of the special provisions of the income tax legislation which absolved agricultural income from the payment of income tax. This was a measure that had been recommended by the East African Commission of Inquiry on Income Tax, of 1956-57. While the effects of the change will not be immediate, in the long run it may have a considerable effect in stimulating the return of agricultural income to the land in the form of improvements. This is badly needed.

Climatically, the year was marked by unusually heavy rains in the early part of the year and also during the late rains. Records were broken, and the total rainfall was everywhere high. While the year's weather was generally favourable, the excessive late rains brought insuperable difficulties to those harvesting the last of the clove crop.

2. Weather

The year opened with unexpected rain in what is usually the dry season. It set the pattern for the year and was most welcome even though tractor cultivation in the rice valleys was held up from time to time. The main rains began in the middle of April and in Zanzibar island were particularly intense. Some flooding of coconut and clove plantations occurred but the adverse effects were not permanent. As not infrequently happens, the rains ceased abruptly in the third week of May and thereafter very little rain was received for three months. By the end of May one rainfall station had already exceeded its average annual rainfall.

The dry weather, with very occasional showers, continued until the end of October. The majority of the early planted crops survived this dry period well, but the porous soils of the Department's stock ranches rapidly dried out and the pasture soon presented the parched appearance that is customary after a dry period. The dry weather adversely affected the planting of the minor food crops, such as pulses and the millets, which are normally planted in August and September. It was, however, of very great assistance to the clove harvest, and the greater part of the crop was harvested under ideal conditions.

At the end of October, the short, or *vuli*, rains began. Of an intensity more often experienced in the *masika*, the rain continued well into December. Though of great benefit to food crops and to the grazing areas, this very wet weather was most disastrous to those clove growers, especially in Zanzibar island, who still had cloves to harvest. The drying of the crop was rendered extremely difficult and much of this part of the crop was lost or spoilt. Rice ploughing was also brought to a halt, for in the sticky soils of the rice valleys the tractors were immobilised.

Rainfall figures are given in Appendix V to this Report. It will be seen that the total rainfall at the majority of the stations was well over the average for the years during which records have been taken. At many centres the rainfall was the highest for several years, while the 107 inches of rain at Kizimbani was the highest ever recorded at that station. During the six weeks of the main rains more than one station received over 55 inches, while 15 inches was common during the four weeks or so of the late rains.

There were no serious wind storms during the year.

3. Principal Crops

CLOVES.

The crop for the seasonal year from July, 1956 to June, 1957 was very close to the official estimate. At 6,993 tons (447,541 *frasilas* of 35 lb.) it was 30 per cent below the mean crop for the previous five years. Disposal of the crop proceeded steadily throughout the period and by the end of June, 1957, there were very small stocks to carry forward in the hands of growers or merchants.

The average local market price during the seasonal year was Shs. 207/26 per 100 lb. Starting the season at Shs. 200/61, the monthly average price rose to Shs. 245/11 in January, 1957 and fell to Shs. 204/62 in June. As compared with the 1955/56 season, exports to Indonesia fell whereas those to India increased, the former territory taking 57 per cent and the latter 29 per cent of the total exports.

By April it was clear that the 1957-58 crop would be exceptionally large. At this time the normal import of clove drying mats by dhow from Arabia had already been completed and local prices for this essential article rose steeply. To help relieve the situation the Clove Growers Association purchased 20,000 mats from Lamu and sold them at a price

just sufficient to cover expenses. A feature of the crop in Pemba was that instead of the usual progression of ripening from the south to the north of the island, which may be spread over five or six months, all the clove areas except those in the far north ripened their crop within $3\frac{1}{2}$ months. This placed an added burden upon the limited supply of local labour. By chartering a special vessel to make daily journeys between Zanzibar and Pemba and by running H.H.S. "*Seyyid Khalifa*" on five days each week, Government was able to transport some 28,000 pickers to Pemba within eight weeks. An additional 14,800 persons arrived by other means.

Dry weather was experienced from the start of the harvest in July until the end of October, by which time most of the Pemba crop had been picked. Although a proportion of the crop—variously estimated at 5 to 15 per cent—was lost through becoming over-ripe, harvesting progressed well, and the cloves produced were of excellent quality. The unusually heavy rains of November and early December affected severely the late crop in the far north of Pemba and in various parts of Zanzibar. Proper drying was precluded and at times even picking was impossible. In consequence this late crop contained much "khoker" (cloves which have become heated in the heap) and crop owners suffered considerable losses. Picking rates started at 50 cents per pishi (about 4 lb.) of green cloves in both islands. In Pemba the rate rose to Shs. $1/75$ at the height of the season and in Zanzibar to Shs. $1/25$. Average prices paid for the whole crop were about 95 cents per pishi in Pemba and 75 cents per pishi in Zanzibar. One pishi of green cloves gives approximately 1.3 lb. dried cloves. Branch breaking increased as competition for pickers strengthened, and a number of prosecutions were necessary. Nevertheless, the degree of branch-breaking was far less than had been experienced in previous bumper crop years.

During the six months from July to December inclusive a total of 21,744 tons (1,391,599 frasila) passed through the Central Market and the Clove Growers Association depots in Zanzibar and Pemba. This in itself is a record crop, exceeding the previous record of 1937/38 by 35,683 frasila. Of this total about 86 per cent (1,195,444 frasila) came from Pemba and 14 per cent (196,154 frasila) from Zanzibar. The amount of crop still in the hands of growers and others at the end of the year and not yet marketed has been variously estimated at from 100,000 to 200,000 frasila.

The season commenced in July with average local prices at Shs. 200/66 per 100 lb. and during the succeeding months the price fell slowly to Shs. 200/07 in October. From July to December exports of cloves were slightly above normal but stockists and exporters were not prepared as they normally are, to purchase cloves in quantities much greater than immediate export requirements. This change in attitude was no doubt due to shortage of funds, high interest rates on borrowed money, the uncertainty of markets abroad, and the lack of price fluctuations on which speculation depends. The Clove Growers Association whose buying price was Shs. 200/- was in consequence called upon to buy a high proportion

of the crop. Not expecting a future rise in price, growers did not make use of the Association's deposit system but preferred to sell outright. On 18th December the Association suspended purchasing of cloves. This course was forced upon it as a result of the current financial restrictions and the situation resulting from the growers having off-loaded on to the Association in some $4\frac{1}{2}$ months an amount of cloves that was approximately double the average annual crop.

Following the cessation of buying by the Association the local market price fell to Shs. 130/-. The Association continued to offer to take cloves on deposit, but at half the previous price. The Association's selling price to exporters during 1957 was Shs. 255/- per 100 lb. for Grade II and exporters were required to take half their export supplies from the Association.

Clove exports during the calendar year amounted to 11,793 tons, some 251 tons less than in 1956, but nevertheless greater than the average for the past five years. Indonesia took 54 per cent of the exports and India 31 per cent. These figures compare with 68 per cent and 23 per cent respectively in 1956. Singapore came more into the market, taking $4\frac{1}{4}$ per cent in 1957 as compared with $\frac{1}{4}$ per cent in 1956. Exports during the four quarters of the year were 2,811 tons, 1,905 tons, 3,901 tons and 3,176 tons respectively. Export duty was Shs. 59/- per 100 lb. until 1st October, when it was raised to Shs. 60/- per 100 lb.

The Clove Growers Association remained the sole purchaser of clove stems. Prices were Shs. 16/50 per 100 lb. for commercial quality and Shs. 11/- per 100 lb. for inferior quality. Purchases during the 1956/57 season amounted to 2,393 tons. During the period July to December 784 tons were taken into stock. Export of oil during 1957 amounted to 219,530 lb. (98 tons) of which 54 per cent went to the United Kingdom and 45 per cent to the United States. The 1956 proportions were 71 per cent and 29 per cent respectively. The change was due largely to increased sales to the States rather than to reduced sales to Britain.

In the 1956 Report of this Department a revival of the trade in mother-of-cloves was noted. Prices of up to Shs. 35/- a 100 lb. were being paid by local merchants at the end of the year and a considerable export trade appeared to be developing. Reports later indicated that although a proportion of the exports might be used for dyes and unguents in the Far East, some was undoubtedly being used to adulterate cloves in other markets. When current stocks had been sold therefore, further export was prohibited.

COCONUTS AND COPRA.

Since 1950, when the whole of the copra crop was crushed locally and exported as oil and cake, there has been a steady increase in the proportion of the crop exported as copra rather than as oil and cake. This trend has followed an improvement in the quality of copra being made, particularly by a few copra-makers exporting on their own account. During 1957, however, import restrictions imposed by India for financial reasons

affected the copra trade to a considerable degree, for India had recently been the principal market. At the same time the demand for coconut oil on the mainland of East Africa improved. In consequence the trend mentioned above was reversed, and a greater proportion of the crop was exported as oil. In the following table are shown the exports of oil and copra over recent years, and the percentage of the crop exported as copra.

Year		Oil tons		Copra tons		Copra as per cent. of total
1954	. .	3,977	...	5,805	...	46.7
1955	. .	3,710	...	5,406	...	46.6
1956	. .	3,617	...	6,590	...	52.2
1957	. .	4,433	...	2,137	...	21.6

Exports of coconut products for the year are shown in the following table:—

		Exports		Copra equivalent
Copra		2,137 tons	...	2,137 tons
Coconut oil		4,433 „	...	7,388 „
Soap		1 „	...	1 „
Copra cake		3,660 „	...	—
Coconut fibre		1,523 „	...	—
Coconuts		2,467,000 Nos.	...	347 „

During the last few months of the year the large clove crop affected adversely the production of copra and other coconut products, for many of the climbers and other coconut operatives were attracted by the higher wages paid for clove harvesting. Moreover, there was a ready sale for fresh coconuts amongst the immigrant clove pickers. In consequence, many plantation owners were able to effect only three gatherings during the year instead of the customary four, and wages for operatives rose.

The year opened with local market prices ranging from Shs. 16/- to Shs. 17/- per frasila (Shs. 45/71 to Shs. 48/57 for 100 lb.). From April the price began to fall, dropping as low as Shs. 12/50 per frasila in July. Thereafter there was a gradual recovery to from Shs. 14/- to Shs. 17/50 per frasila (Shs. 40/- to Shs. 50/- per 100 lb.) in December. Prices for coconuts followed the same general trends, but the recovery towards the end of the year was slower in taking effect. Starting the year at Shs. 105/- to Shs. 135/- per thousand according to quality and locality, prices closed at Shs. 80/- to Shs. 120/- per thousand.

The production of mattress fibre is increasing and the product is steadily gaining recognition in overseas markets. With five mills operating, including that belonging to the Copra Board, a total of 1,523 tons of fibre was exported. The possibility of introducing standard grades for export was under consideration but it appears that the difficulties of classification would be considerable. Under the chairmanship of the Director of Agriculture, the Copra Board produced mattress fibre and high quality coconut oil and also raised coconut seedlings for sale at one-third to one-quarter of the cost price. Some 34,800 seedlings were issued in Pemba and 51,800 in Zanzibar.

4. Subsidiary Export Crops

The production and export of chillies rose once again, and it would seem that the disappointment occasioned by the fall in price early in 1956 has been overcome. Exports during recent years have been as follows:—

1954	...	...	...	27 tons
1955	...	...	...	49 "
1956	...	...	...	62 "
1957	...	...	...	71 "

The local market price ruling at the close of business on 31st December, 1956 was Shs. 125/- per 100 lb. Over the succeeding six months it gradually fell and from the end of June onwards stood at Shs. 90/- to Shs. 110/- per 100 lb.

Derris exports for the year totalled 3,009 lb. This was almost entirely the produce of the Department's farms.

Some 7,130 lb. of coil tobacco were exported. This was a quantity which had been purchased by the Clove Growers Association in 1956 shortly before Somalia stopped buying from Zanzibar, and for which a sale was found in June. With the continued closure of the Somalia market there were no other recorded exports during the year.

Lime oil and lime juice manufactured by the Clove Growers Association has found ready acceptance in overseas markets. The Association purchased 59 tons of lime fruits for processing and exported 400 lb. lime oil and 1,980 gallons of racked juice. Some 3,600 bottles of lime cordial and lime syrup were sold in Zanzibar. While the quantities exported are still small they show promise for the future.

5. Food Crop Production

Preparations for the rice crop usually begin in October and the main crop is sown at different times according to locality, between December and March. In a few areas rice is also sown in August, but this is very exceptional.

In 1956, preparation for the 1957 crop began unusually early and greater activity was shown than for some years. This was largely due to the clove crop being relatively small, as it had been for the two previous seasons. The cultivators therefore had both the time and the need for extra rice cultivation.

The Zanzibar rice acreage (7,878 acres) was almost double that of 1956 and as the weather was very favourable for rice production the yields were good. In Pemba the acreage increased by a third to 9,675 acres. Although these acreages are the highest since 1951 in Zanzibar and since 1953 in Pemba, they are nevertheless little more than half the average acreages sown in the ten years preceding these dates.

During the past 15 years adequate production of rice has been encouraged by legislation which required the planting and proper maintenance of a minimum acreage of rice by every able-bodied cultivator.

The planting of cassava and sweet potatoes was also made obligatory from year to year as the food situation required. The regulations under which these planting orders were made were rescinded after the 1957 rice crop had been planted. It is too early to assess the effect of repealing the regulations for, although the acreage which will be planted in 1958 will be smaller, other factors have undoubtedly contributed to the reduction.

Because of the heavy demand for clove pickers from July to November and the abundant money in circulation thereafter, very little hand cultivation for rice was undertaken by the end of the year. In these circumstances tractor cultivation was more in demand and this work was going ahead well until halted by the heavy rain in November. It is certain that less rice will be sown in 1958 than in 1957, though the acreage ploughed by tractors will be greater.

There are encouraging indications of an increased appreciation of the value of fertilisers, particularly for rice, and it is probable that sales of fertilisers during the season will increase quite considerably, and may reach two tons.

Root crop production was maintained at a normal level with plantings made in January and in April and May. There was little planting later in the year, as cultivators were engaged on clove picking.

6. Animal Husbandry

In March, a disease condition simulating mild foot-and-mouth disease appeared in the northern and central areas of Pemba. Movement control was established and the spread of the disease was limited. There were no reported fatalities. The disease was not positively identified, and with no fresh cases occurring after some five weeks, all restrictions were removed on 1st June.

An outbreak of foot-and-mouth disease in Dar es Salaam towards the end of the year necessitated the prohibition of the import of all cattle from that area. This caused some inconvenience, for the greater part of Zanzibar's meat supply comes as slaughter stock from Dar es Salaam. Slaughter cattle from Mogadishu all arrived with ear tags indicating inoculation against rinderpest.

There was no change in the systems of cattle management followed by local cattle-owners, but increasing use is being made of the Department's facilities for spraying against ticks. The success of the Department's ranching schemes has stimulated the interest of a group of butchers and farmers who have formed a co-operative and propose starting a similar ranch if a suitable site can be obtained.

Imported animals, including those from Somalia, generally arrived in fair condition. Doubts have been expressed about the use of dhows for the movement of livestock. Experience in Zanzibar has shown, however, that with a system of inspection and licensing of vessels the animals travel in adequate comfort, and the incidence of casualties in animals carried in dhows during the past year was insignificant. That restricting licensing to powered craft only would not be a sufficient safeguard was shown when forty head of cattle out of a consignment of 120 were lost on a voyage from Mogadishu in a powered coastal schooner. Legal action was taken in this

case. Occasional heavy losses in dhows have been known in the past, particularly when vessels have encountered very stormy weather. The following table shows the number of animals imported for slaughter in 1957 and previous years:—

			1957	1956	1955	1954
Cattle	...	...	4,026	5,012	4,066	4,784
Goats	...	...	10 625	12,339	11,964	14,889
Sheep	...	...	1,208	1,319	1,442	2,150

Of the 1957 imports, 85 per cent of the cattle, 68 per cent of the goats and 89 per cent of the sheep came from Tanganyika. Most of the remainder were from Somalia.

The reduction in the number of imported cattle and goats is surprising in a year when a record clove crop was harvested entailing an influx of immigrant pickers and a relatively free flow of money. In Zanzibar town, although there was an increase in the number of local stock slaughtered in 1957 as compared with 1956 and previous years, the additional numbers do not compensate for the falling off in imports. It must be assumed, therefore, that the general level of meat consumption in the town fell during the year. In Pemba, on the other hand, the number of animals slaughtered was the highest for some years. This was achieved largely through increased use of local stock. The increase in consumption occurred entirely during the clove season. The following table shows the number of animals slaughtered at the Zanzibar town abattoir and in Pemba:

Zanzibar Town Abattoir

			<i>Oxen</i>	<i>Cows</i>	<i>Calves</i>	<i>Goats</i>	<i>Sheep</i>
Local stock	...	...	554	306	273	3,411	4
Imported stock	...	...	3,197	52	13	8,454	1,689
TOTAL	...	...	3,751	358	286	11,865	1,693
1956 Total	...	...	4,203	221	195	14,383	1,538
1955 Total	...	...	3,618	286	129	14,131	2,120

Pemba Townships and Rural Areas

			<i>Cattle</i>	<i>Goats</i>	<i>Sheep</i>
Local stock	...	...	3,910	694	—
Imported stock	...	...	597	403	58
TOTAL	...	...	4,507	1,097	58
1956 Total	...	...	3,088	1,474	68
1955 Total	...	...	4,001	261	1,136

The preparation of hides and skins at the Government drying shed in Zanzibar continued and the following numbers were dealt with during the year:—

			<i>Hides</i>	<i>Skins</i>
From abattoir	...	...	4,364	14,480
From rural areas	...	...	434	2,176
TOTAL	...	...	4,798	16,656
1956 Total	...	...	5,002	18,367
1955 Total	...	...	3,773	16,275

In Pemba the preparation of hides and skins was in the hands of butchers and no figures are available. The quality of hides and skins exported, although occasionally meeting with unfavourable comment, was in general of a high standard.

SECTION B.—THE WORK OF THE DEPARTMENT

1. Staff

The Director, Mr. A. K. Briant, O.B.E., and the Senior Agricultural Officer, Mr. G. E. Tidbury, were in charge of the Department during the year. Mr. Briant took leave from June to November, when Mr. Tidbury acted as Director, and Mr. R. K. Tremlett, Agricultural Officer, as Senior Agricultural Officer. On the delayed return of the Director, Mr. Tremlett acted as Director for one month.

The Department was sorry to lose on retirement three officers of long service in Zanzibar. They were Mr. Tidbury, Mr. A. C. E. Callan, M.B.E., Inspector of Produce and Mr. I. G. C. Squire, for many years Manager of Plantations and latterly officer-in-charge of the Citrus Scheme. All three officers have given devoted and distinguished service to the Protectorate and their experience will be sadly missed. Their total service in the Department amounted to 69 years.

Mr. J. V. Webdale, Agricultural Officer, arrived on transfer from Tanganyika, having previously served in the Sudan. He replaced an agricultural officer of comparable seniority who left on transfer in 1956. Mr. Said Hamed Mauly completed his studies in England and at the Imperial College of Tropical Agriculture, Trinidad, and was appointed Agricultural Officer.

A list of senior staff is shown at the cover of this Report. Postings were infrequent. In the Pemba District Mr. Webdale took over from Mr. Tremlett in July; at Kizimbani Mr. Bowden, Assistant Agricultural Officer, took over from Mr. Walker, Assistant Agricultural Officer, in November; and Mr. de Souza, Field Officer was transferred from the Pemba District to work on the control of *Trogoderma* in Zanzibar, releasing Mr. Hassania, Field Officer, for educational work at Kizimbani.

The Fisheries Officer took vacation leave and the Forest Officer and Mr. Walker went on leave towards the end of the year.

Mr. Othman Shariff, Assistant Agricultural Officer, took sabbatical leave in the United Kingdom where he spent many weeks studying artificial insemination at the South Bar Cattle Breeding Centre near Glasgow. Two other local officers continued their studies in England and India. One member of the junior staff was sent to England for a year's course.

2. The Development Programme

The second Development Programme, which covers the period 1955 to 1959, continued without major change during 1957. The main projects included in the programme are General Crop Development, the Citrus Fruit Industry, Rice Cultivation (mechanical cultivation), Insect Research (*Pseudotheraptus*), the Experimental Control of Clove Diseases ("Sudden Death" and "Slow Decline"), Stock Husbandry, Fisheries Development, Forestry Development and Agricultural Training (village extension work). The programme of work under General Crop Development in particular and

to a lesser extent under some of the other projects is closely interwoven with the general experimental and extension work of the Department. Development activities during the year are described either in the following sections of this report or in the earlier sections on clove and coconuts.

3. Crop Husbandry

CASSAVA.

The programme of testing hybrid cassavas produced at Amani in 1950, 1953 and 1956 was continued. Criteria for retention are yield, palatability and resistance to virus diseases. Four varieties from the 1950 batch have been retained and bulking up progresses. They are 46106/26, 46106/27, 4697/4, derived from crosses between cassava and ceara rubber, and T.206, derived from cassava and tree cassava. The first three have been issued in fair quantities to cultivators. The most popular is 46106/27. The variety T.206, which was earlier discarded from the Kizimbani trials as just failing to reach the yield standard, has done exceptionally well in trials on potash deficient *kinongo* soil and is now being given further trial elsewhere.

In a manurial trial, farmyard manure increased yields from eight tons to nearly ten tons. This trial, as well as other routine plantings, illustrated clearly a principle that is well known but too rarely acted upon; namely, that it pays to do such crops well in the early stages in order that they may rapidly attain a position of dominance over weeds.

COCOA.

A sale was eventually made of the small quantities of *criollo* cocoa which had been sent to London from the 1955, 1956, and 1957 crops. A clove taint, probably the result of storage in a building previously used for cloves, was in part responsible for the low price of £15 per cwt. The Department is not actively encouraging the planting of cocoa at present but 200 plants of the *forastero* variety were issued in Pemba and 1,500 in Zanzibar. This is the only variety now being planted in departmental trials. Spacing and manurial (N,P,K) trials on *forastero* continued. Individual trees in the trials have made good growth; planted in 1955, some trees were 5 feet in height. Others were severely stunted, probably due mainly to drought conditions and insect attacks on the leaves. The use of coir fibre dust and Seradix B3 continues to be the best method of producing rooted cuttings in the solar propagator. Coir dust is also being tried as a mulch for young cocoa planted under bananas.

Mr. D. H. Urquhart, one-time Director of Agriculture in the Gold Coast and author of "*Cocoa*" in the Colonial Office series, visited the Protectorate in November. He agreed with the Department's decision to change from *criollo* to *forastero* and was of the opinion that the latter might be grown successfully. The importance of the degree and type of shade and adequate soil surface cover was stressed. He recommended concentrating on the *amelonado* types and importing some upper Amazon types through Kew.

CHILLIES.

Nurseries for free distribution of seedlings in both Zanzibar and Pemba were maintained. The market price, however, has remained at the level to which it dropped in 1956, and growers are consequently beginning to lose interest in the crop. In 1957 only 159,000 seedlings were taken by growers in Zanzibar as compared with 427,000 in 1956 and 617,500 in 1955. In Pemba issues were negligible. This drop in plantings may in part be attributed to the large clove crop. Not only did growers have no time to plant chillies in the second rains, but they also failed to harvest a proportion of the crop which ripened in the second half of the year.

Gross returns and costs of production at Kizimbani farm show that, in spite of the reduced prices, the crop is profitable to grow, particularly for the peasant farmer who does not have to pay for labour for harvesting.

CITRUS.

While the young trees planted under the Citrus Fruit Industry Scheme benefited greatly from the unusually abundant rainfall, many suffered from lack of attention. This was in part due to the scarcity and high cost of labour, resulting from the large clove crop. Once again it was not possible to make full payment of the bonus money available, for a bonus is payable only if the plants are properly cared for. These bonus payments are made during the first 4 years after planting out; the last payments will be due next year. During 1957 a sum of Shs. 13,945/10 was paid to 99 planters. Of 31 plantations which failed to qualify, twelve were abandoned by their owners.

Fires occurred in 24 plantations involving 15 acres of oranges, 14 acres of limes and three acres of mandarins. Not all of these were badly neglected plantations and some good trees were lost. A two-month's delay in attending to grass and weeds may be fatal and it would seem that if planters are unable to keep their plantations clean weeded, they should interplant ground crops amongst the citrus.

In November, Dr. J. C. Hopkins, Director of the Commonwealth Bureau of Mycology, visited Zanzibar to consider the desirability of arranging for special research on withertip disease of limes. Arrangements have now been made for a mycologist from the Colonial Pool to come to the Protectorate early in 1958 and study the problem, possibly over a period of two years. The scheme is to be financed in part from savings under present development schemes and in part by a new research grant under the Colonial Development and Welfare Act. Withertip caused much loss of lime flowers during the main flush in November, when rainfall was excessive. The disease was also particularly in evidence during the main rains of the second quarter.

The Department's pilot plot of eight acres of budded limes, planted in 1952, yielded 23½ tons in the twelve months. The greater part of the crop was obtained between April and September, being fairly evenly distributed over the six months. The fruits had an average weight of about eight to the pound and approximately 260 fruits per tree were obtained. This is double the 1956 figure. The crop was purchased by the Clove

Growers Association at 20 cents per lb. for good limes and 6 cents for damaged. Nett profit, after deducting cultivation, harvesting, spraying and other labour charges, amounted to Shs. 528/98 per acre or Shs. 2/64 per tree. At a departmental farm on "kinongo" soil (red soil over coral) 38 trees gave an average of 45 lb. of limes each. This plot is in the north of Zanzibar and it has remained almost free of withertip.

Limes planted under the Citrus Scheme contributed little to total sales in 1957, but a greater number of the first plantings are expected to come into bearing in 1958. Some of the most forward of the orange, grapefruit and mandarins planted under the scheme have begun to bear but the quantities are insignificant as yet.

The Citrus Fruit Industry scheme provided for the issue of free budded material until 1955. But it is clear that a greater acreage of limes is required if potential markets are to be supplied. To meet this need the Clove Growers Association has allocated funds for the production of more budded material to be issued free to selected growers. Under this arrangement $14\frac{3}{4}$ acres (1,386 plants) were planted up in 1957.

CLOVES.

Under the Scheme for the Experimental Control of Clove Diseases, experiments are being laid down in Pemba to test certain measures for preventing the spread of "sudden death" from centres of active infection. The measures used are the digging of trenches two feet wide and thirty inches deep, and the application of lime to the soil. These treatments are being applied at distances of three or five rows of clove trees from the edge of the outbreak area, from which all dead clove trees are first removed. Four treatments were completed at the first centre in June, and no further spread of the disease has so far occurred. This does not, of course, mean that the value of the treatments is now proved. The preparation of a second site commenced; here seven treatments will be applied. Four other sites are expected to provide room for an additional seven treatment plots, making 18 in all. This is three-quarters of the programme. In Zanzibar the final plantings were made in the experimental blocks of cloves established in areas where the previous generation of clove trees had succumbed to "sudden death" disease. These blocks provide an excellent demonstration of the method recommended by the Department for the establishment of cloves. The method has proved extremely successful and has now been adopted on Government Plantations.

Demonstrations of the control of "die-back" by means of pruning continued in both Zanzibar and Pemba, some 28 privately owned plots containing about 4,042 trees having been treated. They are pruned once each year, as soon as possible after the clove harvest, all damaged and diseased wood being removed. While increasing interest is being taken in this work, enquiries made in 1957 led to the conclusion that the introduction of a general service of this nature, to be paid for by the owners, would not at present meet with a sufficient response.

Experiments by the Clove Growers Association in the drying of cloves in an oil-fired pyrethrum-type drier were in abeyance, but the sliding tray system, built by the Association for sun drying, was in use by the Department. It was once again found to be effective and was of particular value during the wet weather of November.

At Kizimbani the use of plant growth hormones to stimulate the production of clove buds is now under test. The trees are being sprayed with alpha-naphthalene acetic acid at fortnightly intervals. This work started in December and it is as yet too early to expect results.

When giving an estimate of average clove production in the Protectorate it is usual to take a figure of 7 lb. of dried cloves per tree per annum. An indication of how much this figure may be exceeded on occasions is given by the harvest on one of the Department's plantations in Pemba. A $3\frac{1}{2}$ acre field containing 137 trees of about sixty years of age gave an average crop of 28.3 lb. dried cloves per tree, while ten selected trees in the block yielded an average of 67.3 lb. per tree. The gross return for the field amounted to Shs. 2,145/- per acre from the cloves. The stems from these cloves provided a further Shs. 50/- making a total of Shs. 2,195/-. Picking costs were Shs. 1,065/- per acre.

The production of clove seedlings for distribution to the public was on a slightly expanded scale. A high proportion of the seedlings, the production of which was financed by the Clove Growers Association, was given away free. Seedlings whose production was financed from Protectorate funds were sold at 10 cents each, the cost of production being approximately 45 cents each. The numbers of seedlings issued in 1957 were as follows:—

			<i>Free</i>	<i>Sold</i>	<i>Total</i>
Pemba ...	...	...	172,638	64,842	237,480
Zanzibar	...	...	123,665	119,815	243,480
		TOTAL	296,303	184,657	480,960
1956 Total	...	...	137,460	307,587	445,047
1955 Total	...	...	105,895	279,049	384,944
1954 Total	...	...	112,475	168,633	281,108

COCONUTS.

Cocount seedlings were again produced, on behalf of the Copra Board and sold to the public at 10 cents each, a rate which is rather less than a quarter of the cost of production. From seven nurseries in Pemba and seven in Zanzibar a total of 86,710 seedlings were issued, of which 51,817 were distributed in Zanzibar and 34,893 in Pemba.

The Malayan King dwarf coconuts planted at Kizimbani in 1955 continue to make slow growth.

Investigations into the control of *Pseudotheraptus wayi*, the sucking bug responsible for damage to the nutlets and premature nutfall, continued on the lines already laid down. The 100 acre spraying experiment, in which the palms are sprayed from the ground with 10 DRDK, completed the first year of spraying in September. In this trial the incidence of

Pseudotheraptus is assessed by the percentage of fallen nutlets showing damage by the insect. Whenever spraying was done, the damage rate dropped at once to about 5 per cent and within two to five weeks to a minimum of less than 2 per cent. It rose gradually, over a period of twelve to fifteen weeks to a level of about fifteen per cent when the plot was again sprayed and the process was repeated. Meanwhile, in the neighbouring unsprayed area of 100 acres, the damage rate fluctuated between 20 per cent and 68 per cent remaining for the greater part of the period between 35 and 55 per cent.

Yields from the sprayed and the unsprayed area are being recorded and copra out-turn will also be obtained for a proportion of the crop.

COFFEE.

At Kizimbani farm the three varieties *liberica*, *excelsa* and *robusta* were maintained, and during 1957 a variety trial was laid down to compare their production. Manurial and pruning trials on *liberica* were continued. The former demonstrated once again the value of applying a banana trash mulch, the yields under this treatment being three times those of the plots receiving no mulch or manure. Nitrogenous and potassic fertilisers nearly doubled the yields. As the experiment is rather too small to give good statistical results, an identical trial on a larger scale was planted in 1957.

The Liberian coffee is the standard variety used in the districts, and nurseries providing seedlings of this variety for distribution were maintained. A total of 11,046 seedlings were distributed compared with 8,829 in 1956. Issues were approximately equal in the two islands.

DERRIS.

In continuation of the policy of encouraging the planting of derris, nurseries were maintained in both islands at the cost of the Clove Growers Association. Rooted planting material was issued free. Unhappily, interest on the part of the producers is still fitful. A total of 66,663 rooted cuttings were issued, in approximately equal numbers to each island. Allowing for cuttings issued to replace deaths, which were considerable where planting was followed by a dry spell, it is estimated that about seven acres were planted. In Pemba a small acreage was planted during the rains with fair success, using freshly cut unrooted material.

On the Department's farms further acreages were put in, for production purposes. In addition, experiments on the spacing and period of growth to harvest were continued. Harvesting at 12, 18 and 24 months has indicated that rotenone content is highest in the plants harvested at twelve months of age (8.9 per cent). Taking both this factor and yield into account the preliminary indications are that harvesting at 18 months will give the greatest nett return. The present standard practice, based on experience in other countries, is to harvest at thirty months. If the period can be reduced to 18 months it should prove an encouragement to growers.

A half-acre field at Kizimbani yielded at the rate of 1,652 lb. of dried root per acre, giving a nett return of about Shs. 2,200/- per acre.

KAPOK.

Kapok is grown by a small number of plantation owners. The Department produces seedlings for sale and dwarf varieties from the mainland and the West Indies are being tested.

NUTMEG.

A rough survey of the nutmeg trees of Zanzibar island was made and fruit collected for examination. Distinct variations in the appearance of the seed from different trees was noted. Seed from four selected trees was sown in preparation for planting up two acres in 1958.

PEPPER.

A small plot of mature pepper consisting of 97 plants growing on *Gliricidia* trees, yielded 550 lb. of fresh fruit giving 106 lb. of black pepper. Attempts to cultivate pepper on a wide range of other living supports failed. Rooted cuttings are made available for sale.

PINEAPPLES.

An increasing interest in pineapple production was shown, particularly in Pemba. At the request of growers, the Department sent to Pemba some 4,200 suckers from Kizimbani.

At Kizimbani coir dust mulch applied to pineapples increased the yield of the first harvest from 8,319 lb. to 10,503 lb. per acre. This is equivalent to an additional return in value of fruit amounting to approximately Shs. 472/- per acre. The cost of applying the dust was in all probability offset by the reduction in weeding charges effected thereby. The dust is expected to be effective for some years.

RICE.

A number of experiments on rice were undertaken at Kizimbani and also on private land in Pemba. These were largely in connection with determining the manurial requirements of the crop on various soils. Seed rate and time of planting and rotations were also investigated, and varieties from the West Indies were under test.

The value of phosphatic and nitrogenous fertilisers on at least three of the principal rice soils has been fully proved. Some twenty demonstration plots were laid down, the fertilisers being applied to rice grown by the villagers themselves. They were favourably impressed, and it is expected that some two tons of fertilisers may be purchased by rice growers during the 1957/58 rice season, from the stocks made available by the Department.

TOBACCO.

In co-operation with the East African Tobacco Company, which lent one of its field staff for the purpose, trials were begun with Virginia tobacco. The three varieties Harrison's Special, Bonanza and Heavy Western were grown in the main tobacco growing areas of Zanzibar island and at Kizimbani. Results were sufficiently encouraging for the work to be continued in 1958. The number of varieties will be reduced to two, the soil types to be tested will be restricted and manurial responses will be investigated.

YLANG-YLANG.

Improved yields of oil were obtained from the two Kizimbani plots which are in bearing. Both made vigorous growth and were cut back twice during the year. The plot planted in 1949, which started flowering in 1952, yielded in 1957 at the rate of 1,026 lb. of flowers per acre (134 trees to the acre). On distillation the out-turn of oil was 1.35 per cent giving 13.86 lb. of oil per acre. This is more than twice the yield per acre obtained in 1956, which was somewhat lower than that of the two previous years.

4. Mechanical Cultivation

During 1957 the Rice Cultivation Scheme continued to operate with nine tractors in Zanzibar, and one in Pemba. Implements were augmented by the addition of two Krause disc tillers and one offset disc harrow. Staff remained unchanged.

In Zanzibar island, the problem of gaining the acceptance of the people has now been overcome and demand for the tractors for opening up rice land is intense. There is also an increasing demand for their use in the coconut and clove plantations and other upland areas. The main problem now is the economic operation of the scheme.

Experience has shown that rice cultivation charges can cover all costs, including depreciation on buildings and machinery and salaries of all staff. This was attained during one month of 1957. Increased efficiency, by the enlargement of individual units cultivated, for example, is reducing costs, but work all the year round is required to spread overhead charges. Work performed in tree plantations, however, is invariably more expensive than in rice fields.

The 1956/57 rice season cultivations ended in February. Compared with the previous year the acreage ploughed was doubled. But plot size remained small and thus uneconomic. From March to July cultivating amongst coconut and clove trees again proved very expensive and the chief demand for tractors was for areas which were too overgrown for hand cultivation.

During August the machines were overhauled so that an early start to the rice season might be made. But by then the harvesting of a record clove crop had begun and most rice farmers had left their homes. By October,

however, a few had returned, while others had sent money for tractor cultivation. During this month all tractors were working to capacity and in ploughing 438 acres a profit of Shs. 1/99 per acre was made. At the same time the scheme was justifying itself in releasing rice farmers to undertake clove picking. From October to the end of the year practically no hand cultivation was undertaken in Zanzibar, and any land which is hand cultivated will be late planted.

In mid-November very heavy rains fell and all tractor work ceased until the last week of December. This hold-up was responsible for a considerable drop in revenue while over-head costs remained at the normal level. In consequence the rice acreage ploughed in the six months from July to December was less in 1957 than in 1956, and there was a greater average loss per acre.

In spite of the unsatisfactory overall financial position in 1957, there has been real progress towards greater efficiency in more than one respect. The following table shows the improvements made in the economy of the cultivation for rice growing.

			<i>Petrol tractors</i>	<i>Diesel tractor</i>	<i>All tractors</i>
<i>Engine hours/acre ploughed</i>					
1955-56 rice season	...	...	5.3	—	5.3
1956-57 rice season	...	...	4.26	3.31	4.15
1957-58 rice season	...	...	3.29	1.90	3.11
<i>Fuel consumption/acre:</i>					
1955-56 rice season	...	...	4.39 gals.	—	4.39 gal.
1956-57 rice season	...	...	4.39 „	2.75 gal.	4.20 „
1957-58 rice season	...	...	3.91 „	1.54 „	3.61 „

For more economical operation growers have been encouraged to group their plots together for ploughing and harrowing, after which the area is subdivided again into its separate plots. To stimulate this grouping the charges have been fixed on sliding scales. Previously all ploughing was charged at Shs. 48/40 per acre—1 cent per sq. yard—irrespective of size. During 1957 new charges were introduced, the maximum being 2.10 cents per square yard for areas of 200 sq. yards or less, and the minimum 0.70 cents per square yard for areas of over 50 acres. The average size of plot in the 1956/57 season was 0.69 acres, costing Shs. 33/39 for ploughing. Under the new charges a plot of the same area would cost Shs. 42/84. The average charge per acre during the period September to December, 1957, actually worked out at Shs. 49/67.

There has been an encouraging response to these new charges and to the exhortations of the staff. The effects of consolidation may be expressed in the following way, the figures being taken for the period September to December, 1957.

No. of people who had ploughing done	...	...	...	672	} 34 per cent of the total grouped together.
No. of people who grouped together	...	...	...	235	
No. of groups	...	...	...	112	
No. of plots before grouping	...	...	...	961	} 23 per cent reduction in the number of plots for ploughing.
No. of plots grouped	...	...	...	303	
No. of plots ploughed as one	...	...	...	670	
Average size of individual plot measured before grouping	...	...	...	0.97 acres	} 19 per cent in- crease in the size of plots ploughed.
Average size of plots ploughed	...	...	...	1.19 „	

The average size of plot ploughed was 0.69 acres in the two preceding seasons but rose to 1.19 acres during the first four months of the 1957/58 season. Similarly the acreage per person rose from 0.81 acres to 1.24 acres.

At the end of 1957 the total area ploughed for rice in Zanzibar island for the 1957/58 crop amounted to 836 acres as compared with 935 acres for the same period in 1956. The total ploughed acreage for the 1956/57 season was 994 acres. It is confidently expected that this figure will be exceeded in the 1957/58 season. The ploughed acreage in the 1956/57 season amounted to 12 per cent of the total rice acreage in Zanzibar island. It is likely that during the 1957/58 season it will reach 40 per cent.

In Pemba the single tractor ploughed some 57 acres for the 1957 rice crop. This was unsatisfactory in comparison with the previous year and was probably due to a shortage of money in the hands of growers. Preparations for the 1958 crop went ahead well, in spite of the clove crop, and by the end of 1957 a total of ninety acres had been ploughed. The season's total may well reach 115 acres.

5. Stock Husbandry

STOCK IMPROVEMENT.

During the year the Kizimbani herd increased slightly from 325 to 339. The milk herd consisted of about 100 cows. 107 calves were born and 81 animals were sent to the Department's ranches or were slaughtered. At the end of 1957 there were eight mature and ten immature bulls in the herd. Bull number 399, "Ndurumo", was still in service and sired twelve calves. Three of his sons completed the services necessary for progeny testing and were rested. Four other bulls, including one purchased in late 1956 from the farm in North Kenya where "Ndurumo" was bred, began service during the year.

Preliminary experiments in the collection of seminal fluid by an electrical method, which had been started in 1956, were left in abeyance for most of 1957 while a senior member of the staff studied methods of artificial insemination used in the United Kingdom and Denmark.

There was no change in the management of the herd. The cows were fed a supplementary ration of roots (cassava and sweet potatoes), coconut cake, maize meal and wheat bran at milking time. Most of the calves were bucket fed on whole and skimmed milk. A few were reared on nurse cows. The average weight of calves at birth was 41.8 lb. for bull calves and 37.3 lb. for heifer calves. These weights are both about 2 lb. heavier than the 1956 figures. The average monthly milk index in lb. per day per cow in milk dropped from 9.0 lb. in 1956 to 8.9 lb. 1957. This drop was probably wholly due to increasing the number of cows in the herd so that bulls could be tested more quickly. The average milk yield in 305 days increased from 1,987 lb. to 2,225 lb. The culling standard was maintained at 2,600 lb. in either of the first two lactations.

Calf mortality in the first year dropped once again from 8 to 6.5 per cent. There has been a steady reduction in calf mortality since 1952 when it was 20 per cent. Previous to that year it had fluctuated being as low as 5.5 per cent in 1949. East Coast Fever was the most important disease and cause of mortality during the year, although the stock were dipped every five days.

In Pemba seven Kizimbani bulls were at stud at seven centres at the beginning of the year. The three most popular ones served 44 cows belonging to private owners during the year, but the others served few or none. A cowshed was built near Wete in preparation for a programme of sending Kizimbani bull calves of good parentage to Pemba to be brought up on nurse cows. The calves will be reared in the presence of ticks and it is hoped that they will contract East Coast Fever before they are six months old. The natural resistance which calves have at this age, coupled with good feeding should result in recovery from the disease and immunity to subsequent attacks. Six weaned calves which were sent to Pemba in 1956 all succumbed to the disease.

PASTURE IMPROVEMENT.

The 14 new grasses which were obtained from South Africa, Tanganyika and Kenya all made good growth within a fenced area at the Tunguu ranch. Where they had been planted out in narrow strips within a paddock of the dominant *Heteropogon contortus*, and then grazed, they were given so much attention by the stock that none of the species were able to thrive, and some failed to survive. Their ability to withstand grazing, however, cannot be properly assessed until larger areas are available. From September, samples of the grasses were analysed monthly for protein content. Interesting results are being obtained, as the species show considerable differences and all have higher protein content than the *Heteropogon*. It was noticed that whereas *Eragrostis curvula* was palatable to the Tunguu ranch stock, the more sophisticated and better fed animals at Kizimbani would not touch this species when *Brachiaria brizantha* and *Chloris gayana* were available at the same time. It may be that the leaves of *E. curvula* at Kizimbani were older and more wiry.

At Kizimbani the trial comparing stock carrying capacity of *Stenotaphrum dimidiatum*, *Paspalum notatum* and *Digitaria milaniana* was terminated. The observations on yield of certain grasses cut for fodder were also concluded. The yield totals over the last three years ranged from 13 tons to 3 tons per acre, and placed the fodders in descending order as follows:— *Pennisetum purpureum* (Elephant grass), *Digitaria milaniana*, *Melinis minutiflora* (Molasses grass), *Panicum maximum* (Guinea grass) and *Pueraria phaseoloides* (Kudzu vine). *Stylosanthes gracilis* was a failure.

STOCK RAISING (CATTLE RANCHES).

The number of cattle at the ranches at Hanyegwa Mchana and Tunguu continued to increase, both by accessions from outside and by births. At the end of the year there were 520 head at Hanyegwa Mchana and 649 at Tunguu, compared with 407 and 421 respectively at the end of 1956. The health of the stock has continued to be good, and with the relatively wet year, grazing problems were less than in 1956.

Progress was made in the provision of a second homestead at Tunguu at about a mile from the first. By the end of the year a connecting road had been made, a well and windpump were in operation and the first house for staff had been built. The fencing of 20 acres to provide home paddocks was commenced and the paddock area at the first Tunguu homestead was increased to 35 acres. Additional water troughs were built both at Tunguu and at Hanyegwa Mchana. Water was also laid on to the Hanyegwa Mchana cattle dip. An area of about 2 acres in the Tunguu paddock was irrigated for a period and provided some welcome fresh grass for sick animals and down-calvers during the dry season. The system can be of limited application only.

A change was made in the arrangements for weaning calves. Instead of removing them from their dams at a particular age they were weaned when they reached a weight of not less than 200 lb. and at a time when there is good grazing in the paddocks. At both centres the stock are run in four herds—bullocks, suckling cows with calves, dry cows and heifers, and yearlings and weaners. Cows due to calve are brought into the paddocks where they remain for two weeks after calving provided there is sufficient grazing. All bullocks are weighed monthly.

The herds had hitherto been built up largely by the purchase of heifers from Pemba and by the transfer of bullocks and culled cows from Kizimbani. In order to advance the date at which fat stock would be available for slaughter 68 young bullocks were obtained from Tanganyika and 17 bought locally. All these were sent to Tunguu. A further five Boran bulls were purchased from north Kenya. There are now eleven of these animals at the two centres and no local bulls are now in use. The first calves of the Boran bulls were born towards the end of the year and were of good size. A total of 220 calves were born during the year and the calving percentage (calves born: potential dams) was 70 per cent a drop of 15 per cent on the 1956 figures.

Mortality was low amongst the calves and was by no means excessive amongst the adult stock. At Tunguu only one calf died out of 134 born (0.75 per cent) while at Hanyegwa there were four deaths (4.65 per cent). Adult mortality dropped to 1.38 per cent at Hanyegwa and rose to 6.79 per cent at Tunguu. A total of 41 animals were lost from various causes, of which the commonest were the tickborne diseases. Several of the young bullocks from Tanganyika died from East Coast Fever. At Tunguu spraying is done, whereas the animals at Hanyegwa are dipped. Trypanosomiasis remains a problem, particularly at Tunguu, but the measures taken hold it in check. Previously a policy of individual curative treatment had been followed, using antrycide sulphate at Hanyegwa and ethidium bromide at Tunguu. From March, however, prophylaxis with antrycide pro-salt was under test at Hanyegwa. It promises to be successful provided the correct intervals for inoculations can be ascertained.

A small amount of culling took place in both herds during the year and twenty mature bullocks were sold to the butchers for beef at a price of 60 cents per lb. live weight. Averaging 690 lb. weight they fetched an average of £20-14/- each.

VETERINARY ACTIVITIES (DISEASE CONTROL).

Diagnostic and curative services were maintained at veterinary headquarters in Zanzibar and Pemba and in a minor capacity at some six centres in the two islands. In addition a travelling clinic followed scheduled routes in Zanzibar. The numbers of animals treated during the year were as follows:

			Cattle	Goats and Sheep	Donkeys and Mules	Dogs and Cats	Poultry	Others
Zanzibar	...	...	3,947	313	174	557	1,047	37
Pemba	...	...	513	26	12	92	1,159	5
TOTAL	...	...	4,460	339	186	649	2,206	42

The numbers treated in Pemba were 30 per cent fewer than in 1956. This may in part be due to an attempt to charge more people with fees but pre-occupation with the clove crop may also have prevented owners from bringing forward sick animals. In Zanzibar the greater number of cases amongst cattle was caused by trypanosomiasis, followed by helminthiasis and wounds. In Pemba, where no trypanosomiasis occurs, wounds took first place followed by ophthalmia.

Ten cattle dips were maintained. In Zanzibar island dips were in regular use by the town dairymen, but three of the dips erected for the sole use of villagers were still not being used and were not maintained. In Pemba, villagers made regular use of only one of the three dips in existence. Local stockowners, except those dairymen who own grade animals, do not like to dip their cattle. On the other hand the trial introduction of weekly spraying has met with a ready response, particularly in Pemba. In the north of Pemba a mobile team followed scheduled routes, spraying all cattle brought to nine collecting points. In the south, cattle have also been sprayed at four centres. An average of 295 animals were sprayed each week, as compared with 164 in 1956. In Zanzibar a weekly average of 619 animals were sprayed, the majority at Makunduchi. Dog dips were in use at the Veterinary Headquarters and in Wete.

Careful vigilance was maintained on all animals which entered the country. All imported dogs and cats had valid certificates of vaccination against rabies and distemper. Two clinical cases of canine distemper brought to the veterinary hospital were detained and finally destroyed. Cattle imported from Mogadishu carried ear tags to indicate that they had been inoculated with a rinderpest vaccine. Imported fowls were subject to rapid agglutination test for salmonellosis and any reactors were slaughtered. Dairy cattle imported from Kenya were required to be inoculated with foot-and-mouth disease vaccines types A and O.

Store cattle imported from Tanganyika brought with them a virulent form of E.C.F. accompanied by piroplasmiasis (*B. bigeminum*) which caused some deaths and infected the quarantine pasture. A bull imported from Kenya was found to be suffering from an otitis which was shown to be due to an otherwise free-living nematode. This was identified in London as *Rhabditis zanzibarensis*. The worms were shown to be capable

of living and multiplying in the ear for not less than a year and it would appear that if untreated the disease would linger indefinitely. The disease yielded to daily application of 70 per cent alcohol. Epizootic lymphangitis was confirmed in donkeys by cultural methods. At the Zanzibar town slaughter house three cases of tuberculosis were recorded, and one carcase of a bullock imported from Somalia was condemned for lymphatic leucaemia.

Dr. R. D. Brown of the East African Veterinary Research Organisation spent a few weeks in Pemba and Zanzibar carrying out rinderpest immunity experiments. These revealed among other things that cattle inoculated with K.A.G. in 1944 still carried antibodies in significant titres.

Professor Buckley of the London School of Tropical Medicine spent a week in Zanzibar and Pemba examining the blood of dogs and cats for a filarial worm. The Veterinary section provided him with laboratory facilities.

Trials were carried out with antrycide pro-salt as a prophylactic against trypanosomiasis. Groups of 43, 61 and 374 cattle were each treated twice with a five-month interval. Injections were given in the dewlap, the caudal fold and the shoulder, subcutaneously. The caudal fold gave best results. A small number of positive cases occurred among the treated animals, four months and five months after the treatments. Those that did not then respond to antrycide methyl sulphate were treated successfully with ethidium bromide.

6. Forestry

Government's policy in regard to the mangrove forests is the preservation and controlled use of this valuable natural asset. To this end, following beaconing in 1956, Government published its intention to declare as Forest Reserves the principal mangrove areas in Zanzibar Island. Reserve Settlement Officers were appointed to hear claims and these are now under consideration. In Pemba, survey and mapping was completed, and the same procedure will be adopted. Meanwhile, permits for cutting poles for building purposes were issued under other legislation. They imposed conditions of area and species which were designed to allow untrammelled re-growth in areas that had been badly denuded and to preserve the two species which are of greatest value for tannin production. No bark-stripping was permitted during the year, for the trees are still too young. During the war years there was very heavy stripping of bark and numerous large trees, killed at that time, still exist in some of the creeks. A survey of these was made with a view to using them for harbour works.

There are two areas of high forest in the Protectorate, consisting of 3,500 acres in Pemba and 2,146 acres in Zanzibar. The Zanzibar forest at Jozani has been under exploitation for some years, the concessionnaire extracting *Vitex cuneata* (Mfuu) for box-making and *Calophyllum inophyllum* (Mtondoo or Alexandrian laurel) for timber. While extraction proceeds the area is being underplanted with *Calophyllum*, and with some *Eucalyptus* in the wetter areas. During the year some sixty acres of new area were

planted, compared with forty acres in 1956, and 5,000 seedlings were used for replanting the 1956 failures. To assist the growth of planted seedlings and the numerous selfsown *Calophyllum* seedlings which occur, weed species such as figs and palms were poisoned with sodium arsenite.

Exploitation of the Ngezi Forest in Pemba made no progress, and areas expected to be cleared and ready for planting up with *Chlorophora excelsa* (Mvuli) were not available. *Chlorophora* was therefore planted in other parts of the forest where exploitation prior to planting was unnecessary. Lines were cut through the undergrowth and, where possible, overhead shade was removed. *Chlorophora* is light-demanding, and planting lines running east-west have produced better growth than those running north-south. In all, 121 acres were planted in this manner, using 3,531 *Chlorophora* stumps cut from seedlings and rooted cuttings. Within the forest experimental plantings in the infertile sand which under natural conditions supports closed stands of *Phillippia mafiensis*, have shown that *Eucalyptus* and *Acacia auriculiformis* can do quite well in the first two years, by which time heights of over twelve feet have been attained.

Afforestation of the Masingini Ridge, the catchment area for Zanzibar town's water supply, has made steady progress. *Casuarina* is the tree most easily established on the hill tops and slopes but *Eucalyptus* is preferred in the valley bottoms and lower slopes. *Acacia auriculiformis* also grows well. Six other species, more valuable as timber, are also being tried. During the year a total of 37,600 plants were planted in new areas and 4,800 were used for replacements.

Continued efforts were made to establish forest plantations on the open coral land at Dunga, using *Eucalyptus* and *Casuarina*. As previous plantings have suffered greatly from adverse conditions, including weed competition and fire, greater emphasis is now being given to the maintenance of the areas already planted rather than to the planting of new areas. Fire again caused serious damage to a part of the plantation. Firebreaks have been found to be ineffective, owing to high winds, and an effort to effect a controlled burn resulted in the fire getting slightly out of hand.

A policy of consolidation rather than expansion was also followed in the other areas in Zanzibar. At the prison plantations of Kichwele and Walezo a shortage of prisoners limited the work that could be done.

Village planting was not neglected and the Provincial Administration arranged for the planting of some 10,000 seedlings by villagers in the east and south of Zanzibar. No work was possible at the Makunduchi Experimental Reserve area, where it had been hoped to introduce planned cutting and cultivation in an area comprising some 2,860 acres of low bush. The area is now the subject of enquiry by a Reserve Settlement Officer.

7. Fisheries

It is disappointing to have to record the lack of interest shown in Government's scheme for the introduction of powered fishing. After demonstrating the catches that could be made and that there were

possibilities of an interesting and remunerative livelihood, Government has provided a Loans Scheme under which small powered vessels may be purchased on easy terms. Unfortunately, for a variety of reasons, the majority of those who have taken these vessels have not given full attention to their operation. Indeed, only one vessel has been in regular operation throughout the year. This made some useful catches of shark, which were sold in Pemba during the clove season. Success in this case was achieved by the personal attention of one of the joint owners to the actual business of fishing.

Following encouragement by the Fisheries Officer, nylon fishing gear is rapidly becoming popular amongst local fishermen for fishing by traditional methods. Stockists have assisted by accepting delayed payments. It is estimated that nylon fishing gear valued at some £3,650 was purchased by the commercial fishermen of Zanzibar and Pemba during the year. The greater part of this consisted of monofilament line which has now almost completely replaced cotton lines for bottom fishing. Nylon nets are also being increasingly used. Nevertheless, the initial cost of factory-made double-knotted blue shark nets is a factor which deters many fishermen from using them. To overcome this, the more expensive items of nylon equipment may now be purchased under the loans scheme.

8. Education

The concentrated form of extension work conducted by an Assistant Agricultural Officer in six villages in Zanzibar island continued throughout the first half of the year. It was then discontinued, apart from occasional visits, as the majority of villagers had gone to Pemba to pick cloves. Progress in this work is exemplified by the increasing numbers of these villagers who have accepted the value of fertilisers for their rice crops, albeit the expense sometimes deters them from purchasing their requirements in adequate quantities.

Contact with the general populace on agricultural matters was helped by the regular use of the radio. Fifteen minute broadcasts were given every fortnight by field staff, heads of sections and the Senior Agricultural Officer. The majority were straight talks on subjects of particular or seasonal importance or in explanation of policy. As a measure of relief from these more serious broadcasts, a series of plays were given, depicting events in the life of a small farmer and his family (the Zanzibar "Archers"). These proved to be popular, and containing as they did much useful advice and precept they may be effective in stimulating interest in agricultural progress.

The more suitable of these broadcasts were published in the Government weekly paper *Maarifa* and printed as hand-outs for use of extension staff. A quarterly bulletin in English is distributed to local and overseas readers and to the local press. It does not attempt to report the routine work of the Department but discusses experimental and development work and gives occasional advice. Extracts from the bulletins are occasionally published in the local press.

Schools which maintained school gardens were visited from time to time by district staff. At Kizimbani farm three pupils completed the final year of a two-year course leading to possible employment as field assistants. Five other pupils undertook the first year of the course.

There were no agricultural shows during the year. As has been the custom for some years, a Tree Planting Day was held in April. With the co-operation of the Provincial Administration trees were distributed to schools and individuals and planted at administrative centres. Some 600 trees were issued, including *Chlorophora excelsa*, rambutan, durian and sapodilla.

9. Distribution of Planting Material

A list of the planting material distributed in 1957 is given in Appendix II. The same wide range of material as in previous years was produced. Grants from the Clove Growers Association financed the production, for free distribution, of a proportion of the clove and coffee seedlings distributed, of cocoa and chillie seedlings and of rooted cuttings of derris. Seedlings other than clove, chillie, cocoa and coconut were sold at thirty cents each while worked plants were sold at Shs. 2/-. Planting material of food crops was mostly issued free.

10. Government Plantations

On the year's working, taking into account all expenditure including salaries of senior staff, the Government Plantations made a profit of £2,215. Detailed figures of revenue and expenditure are given in Appendix I. Copra and coconuts produced the greatest revenue, followed by cloves. Kidichi Plantation was the largest revenue earner and made the greatest profit. Selem and Mtoni also made profits but Chukwani and Jendele lost money. Chukwani, which consists almost entirely of coconuts, has a high proportion of very poor trees planted in thin soil overlaying rock. At Jendele, which is a very small plantation, revenue exceeded running expenses but could not bear the plantation's proportion of charges for headquarters staff.

Although the 1956/57 clove crop on the Government Plantations was a large one, the 1957/58 crop, in keeping with that of the rest of the Protectorate, was larger still. It was not, however, a record crop, being less than that of 1953/54. The whole crop was picked and sold before the end of the year. Harvesting and drying were impeded during the rains of November and December and there was some loss of quality of cloves and of quality and quantity of stems. Some batches of cloves took up to three weeks to dry instead of the customary five days. The crop was picked in part by the regular labour force on ticket and in part by men on piece work. Rates for the latter started at 50 cents per pishi, and were later raised to 75 cents and Shs. 1/-. The average rate paid was 76.4 cents per pishi. The greater part of the crop was sold to the Clove Growers Association.

The following table shows clove harvest figures compared with those of previous years:—

<i>Season</i>	<i>Green cloves lb.</i>	<i>Dry cloves lb.</i>	<i>Dry stems lb.</i>	<i>Average clove prices per cental Shs.</i>
1957-58 . . .	319,118 ...	99,248 ...	23,046 ...	198.02
1956-57 . . .	212,165 ...	71,455 ...	19,994 ...	198.30
1955-56 . . .	61,916 ...	19,775 ...	5,537 ...	199.32
1954-55 .. .	40,480 ...	12,824 ...	3,290 ...	198.83

Routine planting of clove seedlings, both in new areas and for the filling of gaps was undertaken. Some 8,800 seedlings were planted. In one area of three acres to be planted with cloves advantage was taken of the wet weather in February to plant bananas as a nurse crop. These made such good growth that it was possible to interplant the clove seedlings in April, instead of waiting for one year as had been intended. These clove seedlings have made good growth and survived the subsequent dry periods well. In another area seedlings planted between bananas in 1955 had reached a height of seven feet at the end of 1957. Here, termites killed a number of the two year old trees.

Elsewhere in the plantations a number of mature trees died sporadically from a variety of causes. An experiment testing lime for the control of "slow decline" has so far given negative results. Routine pruning of trees for the control of dieback disease continued as heretofore. A total of 4,350 trees were treated at a cost of Shs. 1.63 per tree.

The gathering of the coconut crop was made difficult owing to the heavy demands on all available labour for the harvesting of the Protectorate's clove crop. Although the wages of climbers and other coconut operatives were raised substantially on two occasions it was not possible to complete more than three gatherings except at Selem, where the fourth was undertaken with difficulty. In spite of this, a heavy crop, amounting to 2,512,199 nuts was picked. The majority of these were made into copra.

The copra production figures for 1957 and preceding years are shown in the following table:—

<i>Year</i>	<i>Nuts made into copra</i>	<i>Copra made tons</i>	<i>Nuts per ton of copra</i>	<i>Average price of copra per cental Shs.</i>
1957 . . .	2,232,031 ...	304 ...	7,344 ...	44.35
1956 . . .	2,327,369 ...	325 ...	7,153 ...	44.89
1955 . . .	2,122,212 ...	306 ...	6,945 ...	40.60
1954 . . .	1,867,472 ...	266 ...	7,040 ...	54.25

Routine planting up of gaps in some of the coconut areas was undertaken. An area of nearly 17 acres of bush land was planted with coconuts along narrow cleared strips. The nuts have taken well and it is the intention to delay general cleaning of the area until they have become well established.

The plantations continued to lose trees through fellings, largely to provide space for house-building or for overhead electricity cables. Wind also took its toll. In all, 411 trees were lost.

Rangers and patrols were maintained as usual. They caught 27 thieves stealing coconuts.

The cocoa areas were maintained but little new planting was undertaken. The *forastero* variety was used exclusively, and the material planted consisted of 1,088 seedlings and 606 rooted stem cuttings. The seedlings were used entirely for filling gaps. Of 606 rooted cuttings produced, 475 were planted in new areas.

Harvesting of limes at the citrus pilot plot, which is situated in the Kidichi plantation, was carried out continuously throughout the year. The bulk of the crop ripened in the period from April to September. A total of 417,153 marketable limes was obtained from 1,600 trees, as compared with 213,985 limes in 1956. The average crop per tree was 260 fruits. Expenditure in the eight acres of limes amounted to Shs. 5,310. Revenue from the sale of the limes was Shs. 9,542 giving a profit of Shs. 4,232. This is equivalent to Shs. 529 per acre or Shs. 2/64 per tree.

The plantations section continued to grow derris and cassava for sale, the latter largely to Kizimbani farm for cattle feed. Compost was made as heretofore and sold at Shs. 7/50 per ton. 453 tons were sold as compared with 515 in 1956. The cost of production was just over Shs. 10/- per ton.

11. Chemical Laboratory

Soil fertility investigations have been pursued using pot tests and plant tissue analyses. In particular, the indications obtained in 1956 that sulphur was deficient in certain soils were followed up in detail on *kinongo* soils. The possibility that the apparent deficiencies might be due to the lack of a trace element normally present in the nutrient solution was eliminated by using purified nutrients; sulphur deficiencies still showed.

Applications of elemental sulphur to citrus and pasture gave no response. A pot test using cauliflower instead of tomato plants also failed to show deficiency symptoms. Microplot experiments with maize were conducted on the "uwanda" *kinongo* soil of the stock ranches. These showed strong positive interactions between sulphur and potash, between sulphur and zinc, and between potash and nitrogen and in one trial a positive response to nitrogen and a negative response to sulphur. This work is being continued. In another experiment on *kinongo* soil with maize where equivalent amounts of the element nitrogen were applied as sulphate of ammonia, ammonium nitrate and urea, a larger response was obtained with the sulphate of ammonia, especially so in the absence of superphosphate. Considering all the evidence so far obtained it seems fairly certain that there is no severe deficiency of sulphur in these soils. Were the soils to be subjected to continued heavy cropping a deficiency might manifest itself, but these circumstances are not likely to arise.

Pemba soils on which manurial trials were conducted by the field staff were pot tested and analysed chemically. In most cases the laboratory work confirmed the conclusions drawn from the field experiments. This was particularly evident with regard to the soils deficient

in nitrogen, and also to the *mtifutifu* soil which is highly deficient in phosphate. In some other respects the results of the three methods were in conflict and the analytical data for available potash did not always agree with either pot tests or field results. The methods used for potash analyses need further investigation.

The routine analyses of Pemba profiles were continued, and work on the *kinako* soils was completed. There are indications that the *kinako* is derived from two different parent materials, affecting the potash content, but the differences are not sufficiently great for it to be necessary to distinguish between them in normal field treatment.

Monthly analyses for protein content of indigenous and introduced grass species were initiated in September.

In addition to the investigational work, the Chemical Section was responsible for routine analyses and reports on various agricultural products, forensic and morbid exhibits, and articles under commercial dispute. A total of 2,100 samples were dealt with, of which 2,036 were submitted by Government departments and 64 by private concerns. The following are examples of the type of article dealt with:—

Agricultural: coconut oil, lime juice, cattle dipping fluid.

Health and Medical: milk, flour, tomato paste, stomach contents.

Police: opium, suspected diamonds, clothing, powdered glass.

Public Works: water, timber.

Private concerns: copra cake, cheese, nylon chiffon, rusted nails.

12. Produce Inspection

Inspection of the territory's major export produce is carried out in two stages.

Under the Adulteration of Produce Decree all cloves, clove stems and copra which are offered on the Zanzibar market or shipped from Pemba to Zanzibar or sold to the Clove Growers Association are examined for moisture content and cleanliness. If found to be below certain standards the produce is rejected and returned to the producer or merchant for drying or cleaning. Pemba produce is inspected in Pemba and again on arrival in Zanzibar, since maintenance of standards during the journeys cannot be guaranteed.

Immediately prior to export, cloves, copra, coconut oil and chillies are examined under the Agricultural Produce Export Decree, which establishes export grades. Certain other produce is inspected and reported on prior to export at the request of the exporter, although this is not required by law.

The rapid arrival on the market of the very large 1957/58 clove crop caused a volume of work and posed problems of storage and clearance which were unprecedented and it is to the credit of the Inspector of Produce and his staff that the difficulties were overcome so successfully. A senior member of the field staff was posted to oversee inspection in Pemba, and both there and in Zanzibar the work was carried out smoothly and expeditiously. It is fitting that this should have been achieved during Mr. Callan's last months with the Department.

The quantities of produce examined under the Adulteration of Produce Decree in Pemba at the three ports and the Clove Growers Association's godowns and at the Zanzibar market during the calendar year were as follows:—

Produce and Origin			Deliveries bags	Passed bags	Failed bags		Percentage of failures
					Excessive moisture	Extraneous matter	
<i>At Pemba:</i>							
Cloves	...	...	476,192	414,580	57,367	4,245	12.9
Clove stems	...	...	54,662	48,089	825	748	2.9
Copra	...	...	51,880	47,798	1,414	2,668	7.9
<i>At Zanzibar:</i>							
Zanzibar cloves	...	...	64,267	57,902	6,203	162	9.9
Pemba cloves	...	...	283,978	266,860	15,120	1,998	6.0
TOTAL CLOVES			348,245	324,762	21,323	2,160	6.7
Zanzibar clove stems			8,360	8,360	—	—	—
Zanzibar copra	...	...	166,863	163,690	3,098	75	1.9
Pemba copra	...	...	47,875	43,998	1,067	2,810	8.1
TOTAL COPRA			214,738	207,688	4,165	2,885	3.3

NOTE.—The cloves examined at Pemba include those purchased there by the Clove Growers Association. These are not subjected to full re-examination and record in Zanzibar, although they are tested from time to time. Pemba clove-stems are not re-examined in Zanzibar.

The figures in the preceding table indicate the value of the examination of cloves in Pemba in reducing the excessive amount of failure that would otherwise occur when Pemba cloves reach Zanzibar, with the consequent dislocation in trading that would result. At the same time they illustrate that consignments do reach Zanzibar containing excessive moisture or extraneous matter. Experience suggests that in a proportion of such cases adulteration has taken place en route.

Produce examined prior to export included 188,240 bales of cloves, 2,136 tons of copra, 23,258 drums and 3,056 tins of coconut oil, and 1,937 bags of chillies.

The inspection and disinfection of produce passing through the Zanzibar port was also under the general control of the Inspector of Produce.

13. Stored Products

In 1956 *Trogoderma granarium* was found in Zanzibar and legal and practical measures were taken in an attempt to eradicate and prevent re-entry of the insect. It had originally been found in cowpeas imported from Burma. In 1957 it was found in Pemba in cowpeas which were probably a remnant from the original importation. It had apparently not spread in Pemba, and the infestation was eradicated.

Legislation enacted in 1956 requires that all food grains, pulses and similar materials to be imported from certain areas of Australasia, Asia and Central Africa should be fumigated in the country of origin, prior to export. Provision was also made for the compulsory fumigation of any

infested produce on arrival in Zanzibar. This legislation was strictly enforced. Subsequently it became clear that produce arriving from Burma was invariably heavily infested with *Trogoderma*, even though it carried a certificate of fumigation, and re-fumigation was therefore necessary on arrival. To relieve merchants from paying for produce to be fumigated twice, Burma was removed from the schedule of territories from which a fumigation certificate is required, and all produce from Burma is now only fumigated on arrival in Zanzibar.

A senior member of the staff was posted in charge of all work in connection with insect control in stored products. This involved the inspection of all vessels bringing produce to Zanzibar, arranging for fumigation to be carried out by a private company and the disinfection of storage godowns in the town. Inspections were made on 76 vessels during the year, and the cargoes of seven were found to be infested with *Trogoderma*. Six of the infested cargoes consisted of rice from Rangoon and the other was of dates and general cargo from the Persian Gulf transhipped at Bombay, and possibly cross-infested en route. All these cargoes were fumigated. In addition fumigation was carried out on Siam rice transhipped at Aden and rice obtained from Mozambique where fumigation services were not available. Fumigation was usually carried out in lighters prior to the produce being landed. In all, 9,495 tons of imported rice were fumigated of which 9,170 tons were from Burma.

In order to satisfy mainland import regulations, and as an internal control measure, used gunny bags and articles wrapped in such material destined for Tanganyika or Kenya were fumigated before shipment. Some 4,000 bales of used gunnies were so treated.

Fumigation in each case consisted of exposure to methyl bromide at a minimum concentration of 3 lb. per 1000 cu. ft. for a period of 24 or more hours. Twenty-three fumigations were carried out during the year.

Where a godown is found to be infested with *Trogoderma*, all the produce in the godown is removed to where it can be fumigated. The godown is then cleared of rubbish, which is burnt, and the godown is sprayed with malathion. The bags of all produce later stored in the godown, and the floor of the godown, are dusted with a powder containing five per cent of lindane. Merchants are also encouraged to mix .04 per cent lindane powder with produce specially susceptible to insect attack, e.g. cowpeas. The treatment adopted appears to be very effective for of 17 godowns originally found infested and sprayed with malathion, *Trogoderma* was later found with great difficulty in three only. A total of 84 godowns and stores were examined during the year, of which eleven were sprayed.

It is apparent that the spraying and sanitation measures undertaken, including the dusting of produce with lindane, has proved of real value to importers and wholesalers. Losses from the attacks of a wide range of storage pests have dropped significantly and merchants have found that they can now carry stocks without the necessity of making quick sales for fear of deterioration. Some 15 species of insect have been identified infesting stored products, while a number of others have not yet been identified.

14. Principal Agricultural Legislation

The following is a list of the more important agricultural legislation promulgated during the year:—

Government Notice No. 5.	The Customs Management (Export Prohibition of Clove Seeds and Plants) Order, 1957. Prohibits the export of clove seeds, clove seedlings and clove plants.	11.1.57
Government Notice No. 8.	The Customs Management (Prohibition of Import of Cow-peas) (Revocation) Order, 1957. Revokes the prohibition which was enforced in 1956 for the control of <i>Trogoderma granarium</i> .	16.1.57
Government Notice No. 61.	The Defence (Land Requisition and Personal Service) (Revocation) Regulations, 1957. Revokes the Defence (Land Requisition and Personal Service) Regulations, 1943, under which compulsory planting of certain food crops was enforced.	23.5.57
Government Notice No. 65.	The Plantation Workers (Clove Picking Contracts) Regulations, 1946. Prescribes the standard contract for the employment of clove pickers for the 1957/58 season.	25.5.57
Government Notice No. 79.	The Clove Pickers Camp Regulations, 1957. Under the provisions of the Labour Decree, minimum standards of buildings and health measures are set out.	25.6.57
Government Notice No. 84.	The Plant Protection (Compulsory Fumigation of Imports) (Amendment) Order, 1957. Deletes Burma from the schedule of territories in which fumigation is to be done prior to export and modifies the dosage of hydrogen cyanide for the fumigation of gunny bags.	8.7.57
Government Notices Nos. 95, 96, 97, 99 and 100.	Notices of intention to constitute as Forest Reserves the mangrove forests at Unguja Ukuu, Muongoni-Pete, Tumbatu Island, Kisakasaka-Kiwani, Makoba Bay and Chwaka Bay.	9.8.57

May, 1958

A. K. BRIANT,
Director of Agriculture

Statement of Revenue and Expenditure of the Government Plantations

REVENUE TO THE NEAREST £

	<i>Kidichi</i>	<i>Selem</i>	<i>Mtoni</i>	<i>Chukwani</i>	<i>Jendeke</i>	<i>Total</i>
	£	£	£	£	£	£
Cloves and stems	7,419	2,046	169	12	351	9,997
Copra	7,645	1,461	2,493	1,485	—	13,084
Coconuts	695	92	50	52	—	889
Coconut crops	15	12	175	84	45	331
Miscellaneous	653	150	354	9	6	1,172
Hire of lorry	10	5	3	2	—	20
Leased plantations	—	57	—	—	—	57
Rent of quarters	20	6	3	5	—	34
TOTAL	16,457	3,829	3,247	1,649	402	25,584
<i>Deduct</i> value of produce brought forward	492	—	158	346	—	996
Balance	15,965	3,829	3,089	1,303	402	24,588
<i>Add</i> value of produce carried forward	1,351	519	562	552	—	2,984
TOTAL	17,316	4,348	3,651	1,855	402	27,572

EXPENDITURE TO THE NEAREST £

	<i>Kidichi</i>	<i>Selem</i>	<i>Mtoni</i>	<i>Chukwani</i>	<i>Jendeke</i>	<i>Total</i>
	£	£	£	£	£	£
<i>Personal Emoluments:</i>						
Headquarters staff	1,223	288	256	176	62	2,005
Field staff	1,647	446	455	208	—	2,756
Total Personal Emoluments	2,870	734	711	384	62	4,761
<i>Other Charges:</i>						
Transport and Travelling	103	51	26	45	29	254
Materials and tools	166	32	10	14	36	258
Labour	11,572	2,465	2,397	1,998	954	19,386
Repairs to buildings	364	69	112	171	—	716
Fuel and maintenance of vehicles	244	122	61	61	—	488
Hire of tractors	100	—	—	—	—	100
TOTAL	12,549	2,739	2,606	2,289	1,019	21,202
<i>Deduct</i> capital expenditure by Forest Office	—	—	—	—	656	656
...	12,549	2,739	2,606	2,289	363	20,546
<i>Add</i> outstandings valued at	25	13	6	6	—	50
TOTAL OTHER CHARGES	12,574	2,752	2,612	2,295	363	20,596
TOTAL EXPENDITURE	15,444	3,486	3,323	2,679	425	25,357
Profit	1,872	862	328	—	—	3,062
Loss	—	—	—	824	23	847

Net profit — £2,215.

Appendix II

Distribution of Planting Material

Areca nut, seedlings	...	...	...	Nos.	207
Avocado pear, grafted	...	...	...	"	26
" " seedlings	...	...	...	"	22
Carambola seedlings...	...	...	...	"	5
Cassava, cuttings	...	...	...	"	98,400
Chillie, seed	...	...	...	lb.	5
" seedlings	...	...	...	Nos.	161,262
Cinnamon, seedlings	...	...	...	"	29
Clove, seedlings	...	...	...	"	489,310
Cocoa, seedlings	...	...	...	"	1,700
Coconut, seedlings	...	...	...	"	86,710
Coffee, seedlings	...	...	...	"	15,651
Cotton, seed	...	...	...	lb.	5
Cowpeas, seed	...	...	...	"	50
Derris, rooted cuttings	...	...	...	Nos.	72,463
Durian, seedlings	...	...	...	"	260
<i>Eugenia javanica</i> , marcotts	...	...	...	"	9
<i>E. malaccensis</i> , marcotts	...	...	...	"	27
<i>E.</i> " seedlings	...	...	...	"	42
<i>E. uniflora</i> , seedlings	...	...	...	"	29
Grapefruit, budded	...	...	...	"	87
Green gram, seed	...	...	...	lb.	6
Kapok, seedlings	...	...	...	Nos.	2,092
Lemon, smooth, budded	...	...	...	"	6
Lime, budded	...	...	...	"	2,038
" seedlings	...	...	...	"	1,303
" sweet, budded	...	...	...	"	45
" " seedlings	...	...	...	"	142
Litchi, marcotts	...	...	...	"	134
Madras thorn, seedlings	...	...	...	"	500
Maize, seed	...	...	...	lb.	78
Mandarin, budded	...	...	...	Nos.	266
" seedlings	...	...	...	"	91
Mango, grafted	...	...	...	"	151
Nutmeg, seedlings	...	...	...	"	351
Orange, budded	...	...	...	"	2,244
Paw paw seedlings	...	...	...	"	410
Pepper, rooted cuttings	...	...	...	"	358
Pineapple, suckers	...	...	...	"	4,236
Pomelo, budded	...	...	...	"	37
Pomegranate, seedlings	...	...	...	"	837
Rice, seed	...	...	...	lb.	607
Sapodilla, marcotts	...	...	...	Nos.	33
" seedlings	...	...	...	"	223
Sorghum, seed	...	...	...	lb.	9
Soursop, seedlings	...	...	...	Nos.	18
Star apple, seedlings	...	...	...	"	19
Sweet potato, vines	...	...	...	Nos.	14,500
Yam, tubers	...	...	...	lb.	9,432

Domestic Exports, 1957

<i>Items</i>	<i>Unit of Quantity</i>	<i>Quantity</i>	<i>Value</i>	<i>Percentage of Total value</i>
Cloves	Cental of 100 lb.	263,974	3,841,630	80.93
Clove bud and stem oil ...	lb.	215,210	85,779	1.81
Copra	ton	2,132	128,689	2.71
Coconuts	cwt.	26,740	29,726	0.63
Oil cake	,,	73,733	76,718	1.62
Soap, common and toilet	,,	13	46	—
Coconut oil	,,	88,661	427,562	9.01
Chillies	,,	1,431	13,255	0.28
Fruit, fresh	,,	2,006	2,163	0.05
Lime juice	Imp. gallons	1,639	560	0.01
Lime oil	cwt.	3	780	0.02
Beche-de-mer	,,	554	6,270	0.13
Tobacco, unmanufactured	lb.	7,130	299	—
Ox hides	cwt.	1,540	7,172	0.15
Skins, sheep and goats ...	,,	193	1,619	0.03
Livestock	No.	2	13	—
Forest products	value	—	679	0.01
Kapok	cwt.	276	2,461	0.05
Coir fibre, unmanufactured	ton	1,499	38,301	0.81
Coir fibre, manufactured	,,	34	2,307	0.05
Shells, marine	cwt.	4,694	26,970	0.56
Fish, dried or salted	,,	98	1,215	0.03
Fish, fresh	,,	1	4	—
Lime	,,	10,297	3,852	0.08
Seaweed	ton	2	136	—
Other unclassified natural products	—	—	48,819	1.03
TOTAL		...	<u>4,747,025</u>	<u>100.00</u>

Appendix IV

Approximate Production of Cloves in Frasila of 35 lb. for Thirty-five Crop Years

(1st July to 30th June)

(Based on receipts of cloves at the Central Market and C.G.A.)

<i>Season</i>	<i>Zanzibar Frasila</i>	<i>Pemba Frasila</i>	<i>Total Frasila</i>	<i>Mean crop per season in 5-year periods Frasila</i>
1922/23	291,417	690,498	981,915	—
1923/24	75,027	236,767	311,794	—
1924/25	240,952	520,490	761,442	—
1925/26	219,192	392,622	611,814	—
1926/27	203,843	529,186	733,029	679,998
1927/28	190,370	500,382	690,752	621,766
1928/29	74,828	125,740	200,568	599,521
1929/30	318,647	610,296	928,943	633,021
1930/31	51,796	201,320	253,116	561,281
1931/32	175,070	760,786	935,856	601,847
1932/33	242,772	244,594	487,366	561,170
1933/34	146,098	781,090	927,188	706,494
1934/35	360,037	503,415	863,452	693,395
1935/36	65,938	232,571	298,509	702,474
1936/37	45,096	351,568	396,664	592,636
1937/38	446,500	909,416	1,355,916	768,346
1938/39	39,879	115,211	155,090	613,926
1939/40	168,041	501,474	669,515	575,139
1940/41	146,323	575,277	721,600	659,757
1941/42	297,578	889,550	1,187,128	817,850
1942/43	40,049	223,691	263,740	599,414
1943/44	263,423	777,218	1,040,641	776,525
1944/45	200,417	459,396	659,813	774,584
1945/46	26,493	161,075	187,568	667,778
1946/47	170,280	924,329	1,094,609	649,074
1947/48	30,914	280,986	311,900	658,906
1948/49	81,700	310,971	392,671	549,312
1949/50	153,888	430,253	584,141	514,178
1950/51	158,588	1,081,786	1,240,374	724,739
1951/52	45,892	290,007	335,899	572,977
1952/53	91,417	82,328	173,745	545,366
1953/54	179,883	1,101,302	1,281,185	723,069
1954/55	97,944	448,927	546,871	715,615
1955/56	139,132	746,093	885,225	644,585
1956/57	117,068	330,437	447,541	666,913
Average for 35 seasons	159,900	494,888	654,788	—

Appendix V

Monthly and Annual Rainfall Totals for the Year 1957, for Stations in Zanzibar and Pemba

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 1957	Total 1956
Kigomasha	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	3.59	0.23	3.05	16.11	11.90	4.15	3.44	1.46	2.82	5.91	13.24	3.96	69.86	53.60
	11	2	11	24	23	9	14	11	14	17	18	9	163	148
Metangatwani	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	4.91	3.69	4.14	23.60	15.58	2.23	2.31	0.70	0.87	5.14	12.41	6.77	82.40	57.13
	9	4	15	24	28	12	18	12	9	17	20	11	189	163
Wete	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7.99	0.87	4.86	22.20	16.42	3.38	2.53	0.99	1.48	1.81	15.44	5.74	83.71	58.99
	9	4	12	23	23	9	10	6	7	8	18	11	140	129
Mkoani	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	6.83	1.74	2.75	27.42	26.59	1.58	1.66	0.56	0.65	4.25	10.29	5.55	89.87	49.22
	13	6	9	19	19	8	6	4	3	3	14	9	113	111
Mkokotoni	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	20.42	14.38	4.80	20.54	25.67	3.30	3.83	4.02	3.80	4.22	9.31	3.88	118.17	48.74
	16	11	7	18	18	7	6	10	8	9	12	5	127	116
Mtambile	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7.42	0.99	2.67	27.27	28.20	2.60	1.78	1.05	1.03	4.23	7.61	7.43	92.28	65.48
	16	7	13	23	22	5	6	8	5	7	17	13	139	160
Wesha	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7.82	2.68	4.29	20.05	18.43	1.90	1.49	0.69	0.88	2.00	8.46	4.22	72.91	60.88
	13	6	14	24	26	11	13	6	5	6	18	15	157	144
Mkwajuni	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7.85	5.48	5.31	17.24	20.31	1.98	3.52	2.90	1.77	2.50	8.99	3.19	81.04	56.64
	13	7	14	25	22	8	13	15	9	8	18	12	164	160
Limbani	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	6.77	2.00	7.70	22.95	16.92	2.87	2.24	0.80	0.91	1.38	16.59	3.86	83.99	66.43
	13	9	15	30	24	8	10	6	6	5	18	10	154	173
Ole	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	7.77	0.09	11.38	20.15	21.13	2.60	2.59	0.25	0.45	1.25	6.26	2.26	76.18	42.63
	12	1	20	26	21	6	10	4	3	6	14	13	136	124
Chambani	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	5.35	1.13	5.04	23.79	19.87	1.75	1.36	0.32	1.13	4.75	9.04	5.56	79.09	53.09
	14	3	15	25	20	5	9	4	4	5	15	12	131	128

Kisongoni ...	...	7.60	2.47	3.84	18.83	18.01	3.56	1.49	1.89	1.21	2.43	16.01	2.37	80.31	49.06
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	7	5	8	17	12	6	6	7	4	4	14	4	7	112
Chake Chake	...	18.41	1.33	22.91	24.04	19.01	1.31	2.18	1.10	0.75	1.68	5.61	2.77	101.10	104.56
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	11	3	20	25	24	8	8	9	3	5	15	13	144	148
Selem	...	8.11	10.26	6.79	14.09	13.21	1.91	2.70	2.24	1.31	6.46	7.85	3.64	78.57	42.33
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	16	7	13	25	18	4	12	16	11	19	20	11	172	162
Kizimbani ...	...	8.62	13.00	11.82	22.30	16.93	1.20	2.28	2.43	2.70	5.41	15.00	4.81	106.50	59.62
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	17	10	25	30	21	7	12	9	12	17	19	11	190	179
Victoria Gardens	...	9.42	5.94	5.64	19.16	16.86	1.74	3.28	2.39	0.23	6.19	12.58	6.96	90.39	47.86
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	14	7	9	25	15	1	11	8	2	11	22	11	136	130
Makunduchi	...	1.25	2.53	3.16	20.04	16.56	1.69	0.87	1.50	0.51	2.18	6.65	2.71	59.65	35.97
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	5	6	6	17	11	3	4	11	6	4	11	10	95	58
Mwera	...	7.79	7.04	4.89	10.66	14.53	0.00	2.97	2.60	1.71	5.09	12.05	6.06	75.39	67.26
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	12	4	9	13	9	-	9	8	4	13	20	12	113	93
Hanyegwa Mchana	...	6.34	6.81	5.88	20.82	17.80	1.32	2.49	2.01	0.45	6.31	8.46	3.55	82.24	48.70
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	17	8	16	26	19	5	10	6	2	12	22	16	159	140
Muongoni	...	4.58	5.45	5.28	26.66	28.23	0.68	2.36	0.75	0.50	2.89	6.27	4.44	88.09	43.80
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	11	11	12	26	18	5	9	6	4	6	18	15	141	116
Kisauni	...	8.43	6.21	7.62	23.26	19.04	1.36	2.47	1.59	0.43	7.00	10.36	6.46	94.23	52.18
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	16	9	13	22	18	1	11	10	4	10	22	13	149	136
Tungun	...	6.58	5.29	8.84	19.16	16.52	1.59	2.11	2.38	0.66	5.61	7.75	5.44	81.91	52.30
	Rainfall in ins.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	No. of wet days	8	7	13	21	15	3	8	7	3	7	18	10	120	118

